

Maryland School
Assessment
Science
2012 Public Release
Grade 5

Part 1



Part 1

- 1** A student measured how quickly a car rolled down a hill.

Which tool should the student have used to measure how quickly the car rolled down the hill?

- ☐ **A** a hand lens
- ☐ **B** a stopwatch
- ☐ **C** a thermometer
- ☐ **D** a centimeter ruler



Part 1

- 2** A student walks to school one morning and notices the grass is wet but the streets are dry.

Which of these processes most likely caused the grass to be wet?

- ☐ **A** condensation
- ☐ **B** erosion
- ☐ **C** evaporation
- ☐ **D** precipitation

Part 1

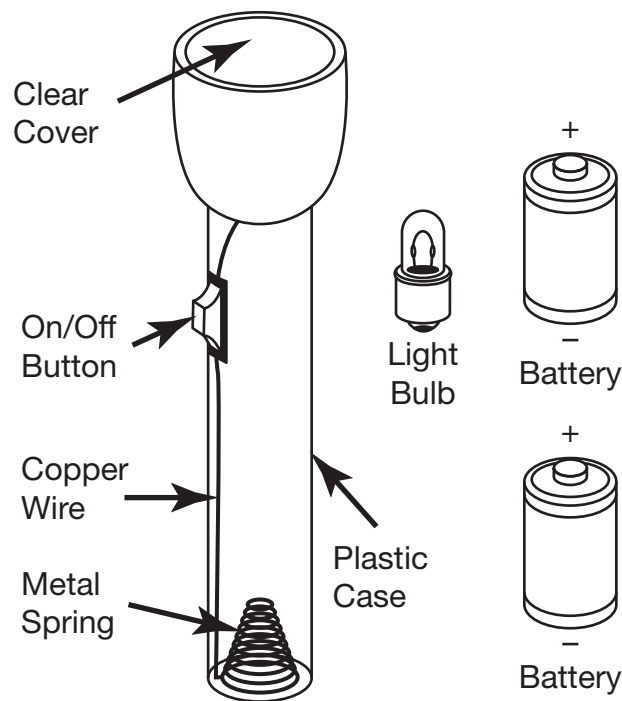
Directions

Use the information below to answer Numbers 3 and 4.

A student pushed the on/off button of a flashlight to the “on” position and noticed that the light bulb glowed. After 15 minutes, the student noticed that the clear cover of the flashlight was warm.

The student pushed the on/off button of the flashlight to the “off” position and the light bulb no longer glowed. After 15 minutes, the clear cover was cool.

The student took the flashlight apart to determine its parts, as shown below.



Part 1

- 3** When a student turned the on/off button of the flashlight to the “off” position, the light bulb did not glow.

The most likely reason that the light bulb did not glow was because moving the on/off button to the “off” position

- ☐ **A** opened the circuit, stopping the electrical current
- ☐ **B** closed the circuit, stopping the electrical current
- ☐ **C** reversed the charge of each end of the batteries
- ☐ **D** stopped the batteries from touching each other

- 4** The student put the pieces of the flashlight together and moved the on/off switch to the “on” position. The flashlight bulb glowed dimly.

What is the most likely reason that the flashlight bulb glowed dimly?

- ☐ **A** The batteries were placed in the wrong direction.
- ☐ **B** The copper wire blocked the electrical current.
- ☐ **C** The stored energy in the batteries decreased.
- ☐ **D** The electrical circuit was open.

Part 1

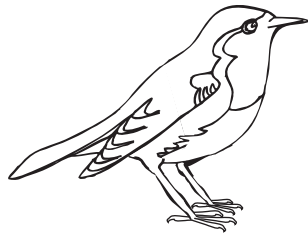
Directions

Use the information below to answer Numbers 5 through 7.

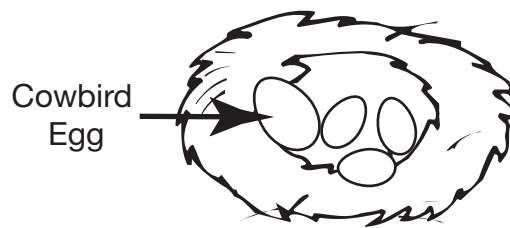
Brown-headed cowbirds are small birds found throughout North American grasslands and along edges of forests. For food, the brown-headed cowbirds rely on grazing animals to uncover insects and seeds.

When a female brown-headed cowbird sees eggs in the nest of another bird, she lays her own egg in the nest. She usually chooses nests with eggs that are smaller than hers. The other bird species then raises the brown-headed cowbird hatchling. The brown-headed cowbird hatchling grows quickly and is larger than the other hatchlings in the nest.

The brown-headed cowbird often lays eggs in the nest of the yellow warbler. The yellow warbler lives near forests, builds nests in trees and thick brush, and eats insects and fruit.



Female Brown-headed Cowbird



Yellow Warbler Nest

Part 1

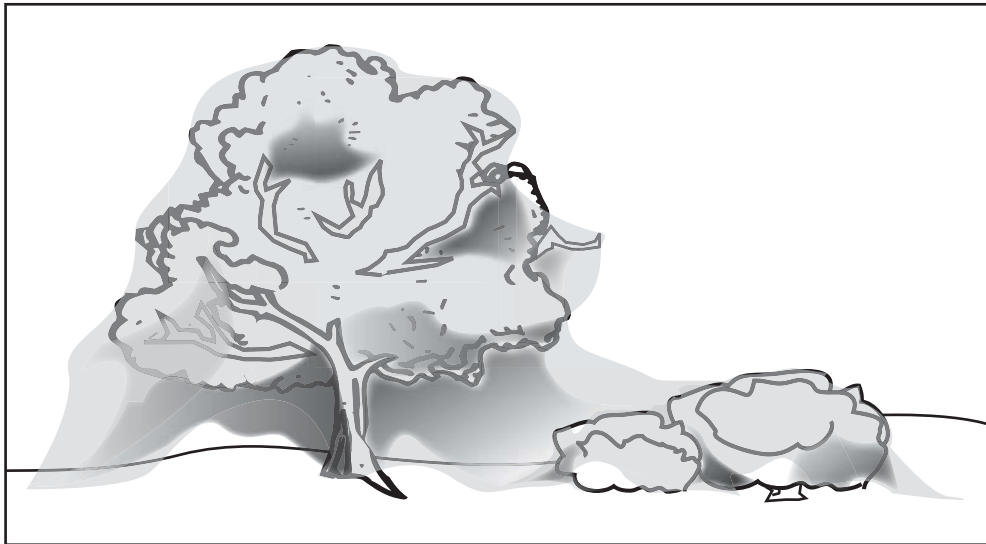
- 5** Why is the appearance of the brown-headed cowbird hatchling different from the other hatchlings in the nest?
- ☐ **A** Physical likenesses are learned.
 - ☐ **B** Physical features are not inherited in birds.
 - ☐ **C** The brown-headed cowbird hatched before the other hatchlings.
 - ☐ **D** The brown-headed cowbird is not related to the mother of the other hatchlings.
- 6** The removal of trees from the habitat of the yellow warbler would most likely cause the population of brown-headed cowbirds to
- ☐ **A** decrease due to decreased nesting areas
 - ☐ **B** decrease due to an increased seed supply
 - ☐ **C** increase due to a decreased number of insects
 - ☐ **D** increase due to increased competition with other birds
- 7** When a brown-headed cowbird eats seeds and insects, most of the food is
- ☐ **A** changed to waste
 - ☐ **B** digested and used for energy
 - ☐ **C** digested and stored for future use
 - ☐ **D** changed to sugar by the energy of the sun

Part 1

Directions

Use the passage below to answer Numbers 8 through 11

Giant Spider Web Envelops Texas Park



Entomologists¹ are debating the origin and rarity of a sprawling spider web that blankets several trees, shrubs and the ground along a 200-yard stretch of trail in a North Texas park.

Officials at Lake Tawakoni State Park say the massive mosquito trap is a big attraction for some visitors, while others will not go anywhere near it.

“At first, it was so white it looked like fairyland,” said Donna Garde, superintendent² of the park about 45 miles east of Dallas. “Now it’s filled with so many mosquitoes that it’s turned a little brown. There are times you can literally hear the screech of millions of mosquitoes caught in those webs.”

Spider experts say the web may have been constructed by social cobweb spiders, which work together, or could be the result of a mass dispersal in which the arachnids³ spin webs to spread out from one another.

Part 1

“I’ve been hearing from entomologists from Ohio, Kansas, British Columbia—all over the place,” said Mike Quinn, an invertebrate biologist with the Texas Parks and Wildlife Department who first posted photos online.

Herbert A. “Joe” Pase, a Texas Forest Service entomologist, said the massive web is very unusual.

“From what I’m hearing it could be a once-in-a-lifetime event,” he said.

But John Jackman, a professor and extension entomologist for Texas A&M University, said he hears reports of similar webs every couple of years.

“There are a lot of folks that don’t realize spiders do that,” said Jackman, author of “A Field Guide to the Spiders and Scorpions of Texas.”

“Until we get some samples sent to us, we really won’t know what species of spider we’re talking about,” Jackman said.

Garde invited the entomologists out to the park to get a firsthand look at the giant web.

“Somebody needs to come out that’s an expert. I would love to see some entomology intern come out and study this,” she said.

Park rangers said they expect the web to last until fall, when the spiders will start dying off.

¹**entomologists** – scientists who study insects

²**superintendent** – person in charge

³**arachnids** – class of animals that includes spiders, mites, and ticks

Part 1

8 The brown body color of the social cobweb spider is

- ☐ **A** learned from parents
- ☐ **B** selected by the offspring
- ☐ **C** caused by the environment
- ☐ **D** inherited from parents to offspring

9 The characteristic of the social cobweb spiders that helps them survive is the ability to

- ☐ **A** attract birds
- ☐ **B** change color
- ☐ **C** work together
- ☐ **D** live through the winter

10 The mosquitoes trapped in the giant spider web are used by the spiders to provide

- ☐ **A** air to breathe
- ☐ **B** color to the body
- ☐ **C** water for energy
- ☐ **D** energy for growth



Part 1

11 Describe how information used by the scientists would be collected. In your description, be sure to include

- the types of scientific tools used
- the information collected using the tools

Write your answer in the space provided.

[illegible]

Part 1

- 12** Two students notice that the constellation Scorpio is directly overhead as they enter a building. When they leave the building several hours later, Scorpio is no longer directly overhead.

Which of these statements explains why Scorpio appears to be in a different location?

- ☐ **A** Earth rotates on its axis.
- ☐ **B** Earth revolves around the sun.
- ☐ **C** The stars are moving through space.
- ☐ **D** The gravity of the moon attracts the stars.



Part 2



Part 2

13 The water cycle requires energy.

The main source of energy for the water cycle is

- ☐ **A** wind
- ☐ **B** gravity
- ☐ **C** the sun
- ☐ **D** the moon



Part 2

Directions

Use the information below to answer Numbers 14 and 15.

Students made lemonade using the following recipe:

100 grams of lemon juice

100 grams of sugar

1,000 grams of water

The students combined the lemon juice, sugar, and water in a container. They stirred the lemonade until all the sugar dissolved. They poured the lemonade into a plastic tray and put the tray in a freezer. The next day, the students removed the tray from the freezer and observed that the lemonade was a solid.

Part 2

14 What is the mass of the solid lemonade?

- ☐ **A** 100 grams
- ☐ **B** 200 grams
- ☐ **C** 1,000 grams
- ☐ **D** 1,200 grams

15 Which statement best explains why the lemonade became a solid?

- ☐ **A** The lemonade was cooled to 100°C.
- ☐ **B** The lemonade was heated to 100°C.
- ☐ **C** The lemonade was cooled below 0°C.
- ☐ **D** The lemonade was heated above 0°C.

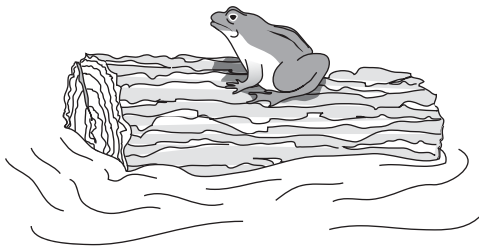
Part 2

- 16 The sun provides heat and light to Earth.

The sun is best described as

- ☐ A a planet close to Earth
- ☐ B the closest star to Earth
- ☐ C a planet that reflects light
- ☐ D the center of the universe

- 17 A student examined the features of a frog and a dragonfly to determine how these animals might become fossils.



Frog



Dragonfly

Explain how fossils are formed. In your explanation, be sure to include

- differences between fossil remains and fossil imprints
- differences between the two animals

Part 2

Write your answer in the space provided.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Part 2

Directions

Use the information and table below to answer Numbers 18 through 20.

Students studied the physical properties of the four metals listed in the table below.

PROPERTIES OF FOUR METALS

Metal	Appearance	Conduct Electricity and Heat	Magnetic	Melting Point (°C)
Zinc	Bluish white, shiny pieces	Yes	No	419
Iron	Dark gray, shiny pieces	Yes	Yes	1,539
Aluminum	Silver, shiny pieces	Yes	No	660
Magnesium	Light gray, shiny pieces	Yes	No	650

Part 2

- 18** The students investigated how magnesium reacted with other materials.

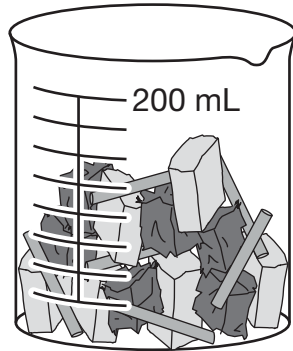
Trial	Materials Combined	Appearance of Combined Materials
1	Magnesium + oxygen	White, crumbly powder
2	Magnesium + water	Light gray pieces in water
3	Magnesium + iron	Light and dark gray pieces
4	Magnesium + hydrochloric acid	White crystals and gas bubbles

In which trials did the properties of magnesium change?

- ☐ **A** 1 and 3
- ☐ **B** 2 and 4
- ☐ **C** 1 and 4
- ☐ **D** 2 and 3

Part 2

- 19 The students mixed equal volumes of zinc, iron, and magnesium in a beaker.



The properties of the mixture are best described as having

- ☐ A a dark gray and shiny appearance
- ☐ B the ability to conduct electricity and heat
- ☐ C chemical properties of magnesium only
- ☐ D chemical properties different from the individual metals

Part 2

- 20** The students mixed small pieces of the four metals on a plate.

Material	Amount Added to Plate (grams)
Zinc	2.0
Iron	3.0
Aluminum	4.0
Magnesium	5.0

The students pulled a magnet through the mixture several times. The magnet attracted and removed small pieces of some metals from the plate.

The mass of the metals remaining on the plate was closest to

- ☐ **A** 2.0 grams
- ☐ **B** 7.0 grams
- ☐ **C** 11.0 grams
- ☐ **D** 14.0 grams

Part 2

- 21** A car and a truck are traveling at the same rate of speed. The vehicles approach a stop sign.

Which statement best explains why the car stops in a shorter distance than the truck?

- ☐ **A** The car has a larger mass requiring less force to stop.
- ☐ **B** The car has a smaller mass requiring more force to stop.
- ☐ **C** The truck has a smaller mass requiring less force to stop.
- ☐ **D** The truck has a larger mass requiring more force to stop.

- 22** Scientists use different tools during their investigations.

What tool does a scientist use to study cells?

- ☐ **A** a balance
- ☐ **B** a microscope
- ☐ **C** a centimeter ruler
- ☐ **D** a graduated cylinder

Part 2

- 23** In 2003, Maryland power plants produced 56% of the electricity used in the state by burning coal and 5% of the electricity using hydropower.

Which of the following statements best describes coal and water as resources?

- ☐ **A** Both are renewable.
- ☐ **B** Both are nonrenewable.
- ☐ **C** Coal is nonrenewable; water is renewable.
- ☐ **D** Coal is renewable; water is nonrenewable.



Part 3



24 Most electrical wires are covered with plastic or rubber.

The wires are covered with plastic or rubber because those materials

- ☐ **A** are conductors of electricity
- ☐ **B** make complete electric circuits
- ☐ **C** are not conductors of electricity
- ☐ **D** make the electricity move quickly



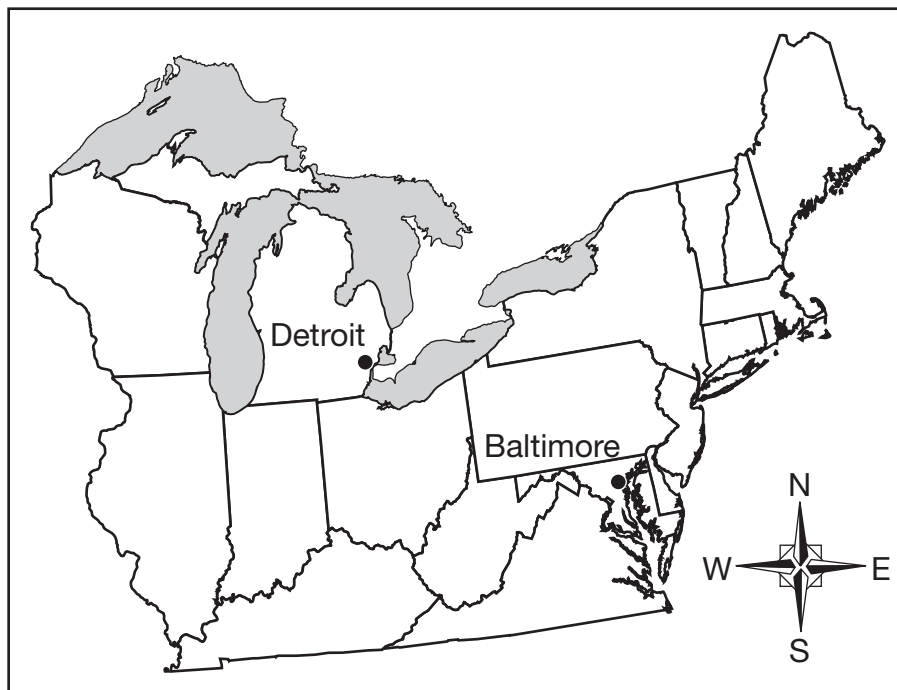
Part 3

Directions

Use the information below to answer Numbers 25 through 27.

The Detroit Salt Mine Company began removing salt from the ground in 1906. This underground mine covers 6 square kilometers beneath the city of Detroit, Michigan. When the mine opened, people used the salt to preserve food, make glass, and tan leather goods. Today, people use the salt to melt ice on highways during winter storms.

NORTHEAST UNITED STATES



- 25** A salt mine consists of several different rocks and minerals.

Which physical property of rocks and minerals is most important when considering the support of the walls in the salt mine?

- ☐ A flexibility
- ☐ B hardness
- ☐ C ability to conduct heat
- ☐ D ability to be attracted by magnets

- 26** Rocks and minerals are made of matter.

Which statement best describes rocks and minerals as matter?

- ☐ A Each occupies space and contains a definite amount of material.
- ☐ B Each occupies space and contains the same amount of material.
- ☐ C All occupy the same amount of space and contain a definite amount of material.
- ☐ D All occupy the same amount of space and contain the same amount of material.

- 27** When salt is mined, machines scrape the mine walls and change salt rocks into very tiny salt crystals.

What happens to the mass of 1 kilogram of salt rocks when the rocks change into very tiny salt crystals?

- ☐ A The total mass increases.
- ☐ B The total mass decreases.
- ☐ C The total mass stays the same.
- ☐ D The total mass increases and then decreases.



- 28** Scientists found evidence of a fish that lived millions of years ago. The fish had features that were possibly used to move on land. This fish is now extinct.

What scientific evidence did the scientists most likely find that confirmed the existence of this fish?

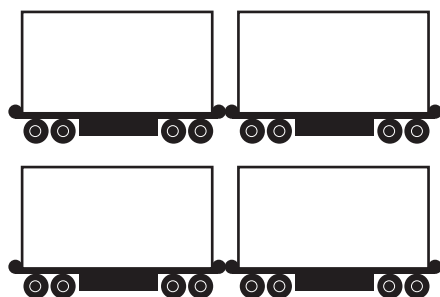
- ☐ **A** a fossil
- ☐ **B** a description
- ☐ **C** a photograph
- ☐ **D** a cave drawing

Part 3

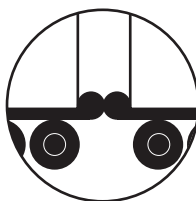
Directions

Use the information and diagram below to answer Numbers 29 and 30.

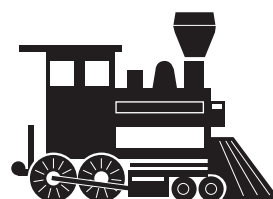
A child received a toy train set. Magnets are used to connect the engine and the freight cars. The train moves on a flat track. A diagram of the train set is shown below.



4 Freight Cars



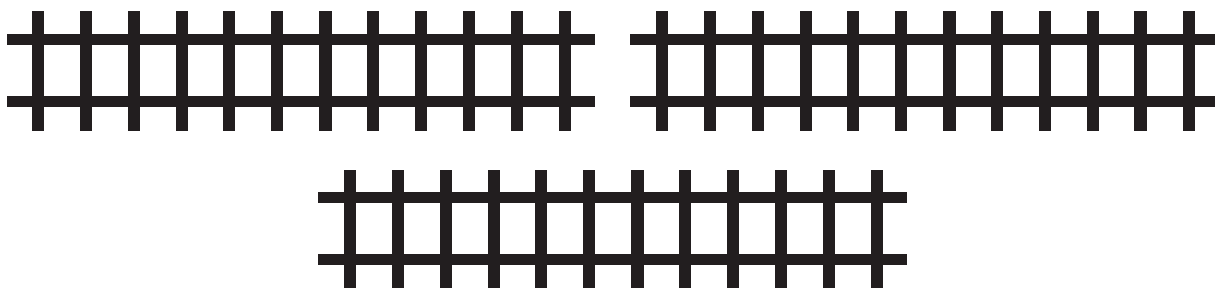
Magnetic Connection



1 Engine



4 Train Stations



15 Meters of Wooden Track



29 Which object does a magnet attract?

- ☐ **A** iron nail
- ☐ **B** rubber ball
- ☐ **C** plastic cart
- ☐ **D** wooden box

30 The child pushed and released the train. The train eventually slowed.

The force responsible for the train slowing was

- ☐ **A** electrical
- ☐ **B** friction
- ☐ **C** gravity
- ☐ **D** magnetic

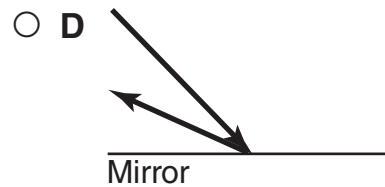
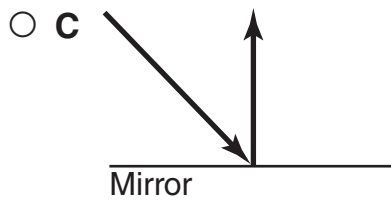
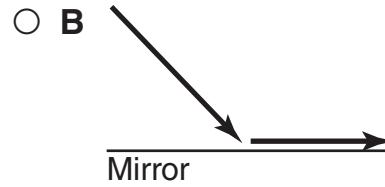
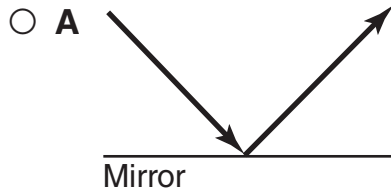
31 Humans need food to grow and survive.

Food that is not used immediately by the body for energy is

- ☐ **A** stored for future use
- ☐ **B** converted to water for energy
- ☐ **C** used to remove wastes from cells
- ☐ **D** transformed into oxygen for survival



- 32** Which diagram best represents the reflection of light rays from a plane mirror?



- 33** The presence and quality of water affects the activities of people in a community.

Explain the importance of water to a community. In your explanation, be sure to include

- ways water is used
- how human activity negatively affects the water

Part 3

Write your answer in the space provided.

[illegible]

34 Old, worn-out rubber tires are called scrap tires.

Which way of disposing of scrap tires is best for the environment?

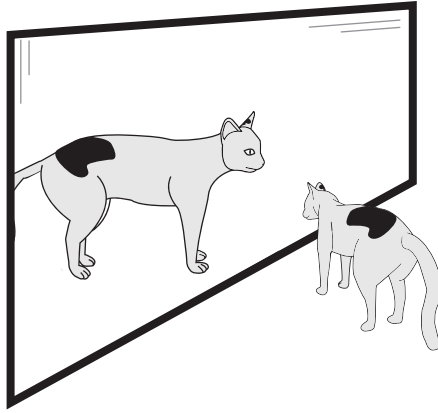
- ☐ **A** burning the tires
- ☐ **B** dumping the tires in a lake
- ☐ **C** burying the tires in a landfill
- ☐ **D** taking the tires to a recycling center

Part 3

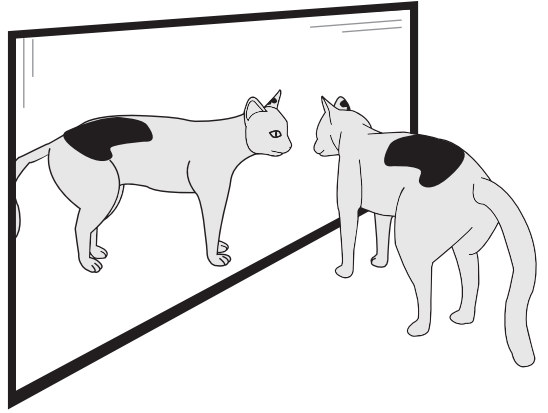
35 A kitten is looking directly into a mirror.

Which drawing best shows the image of the kitten in the mirror?

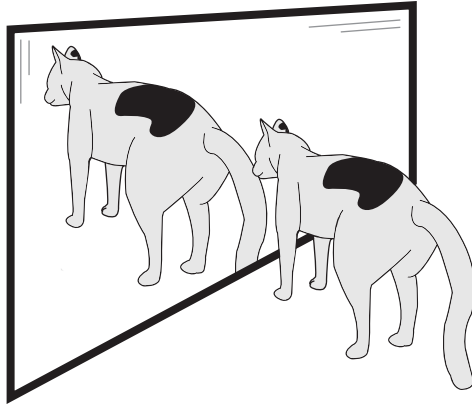
☐ A



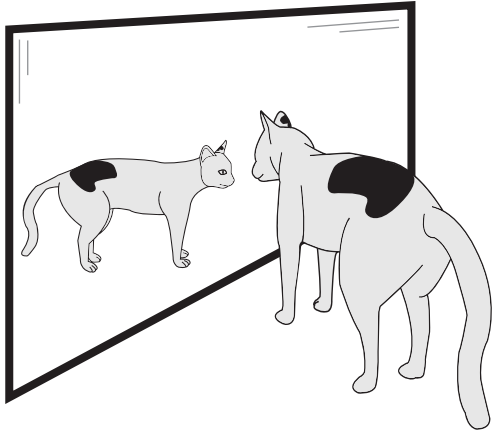
☐ B



☐ C



☐ D





Part 4



36 Some materials are electrical conductors.

Which material best conducts electricity?

- ☐ **A** copper
- ☐ **B** plastic
- ☐ **C** rubber
- ☐ **D** wood

Directions

Use the information and the data list below to answer Numbers 37 through 39.

Two students researched how coal, a nonrenewable resource, is used. The students learned that most coal is burned to produce electricity. Some coal is used to make medicines, paint, and steel. The students recorded a list of some of the effects of burning coal.

Effects of Burning Coal	
<input type="radio"/>	1. Heat energy is released when used to make electricity.
	2. Carbon dioxide gas is released and may cause global warming.
	3. Other gases (sulfur dioxide, nitrogen oxide) are released, which cause acid rain.
<input type="radio"/>	

37 What negative consequence would most likely occur from burning coal?

- ☐ A a decrease in river water pollution
- ☐ B a decrease in gases that warm the air
- ☐ C an increase in river water temperatures
- ☐ D an increase in the amount of air pollution

38 The students investigated how acid rain affected two plants of the same size. Plant 1 received pure water and Plant 2 received water containing acid. All other conditions were kept the same. After growing for five weeks, Plant 2 was shorter than Plant 1.

Which statement best explains the different results?

- ☐ A Plant 1 received fertilizer.
- ☐ B Plant 1 received direct sunlight.
- ☐ C Water containing acid slowed the growth of Plant 2.
- ☐ D Water containing acid decreased the size of Plant 2.

39 The most common use of coal is to

- ☐ A fertilize crops
- ☐ B fuel automobiles
- ☐ C generate energy
- ☐ D heat the atmosphere



Directions

Use the passage below to answer Numbers 40 through 42.

Polar Ice Melting

As spring arrives in the Arctic, new research suggests average temperatures are rising and ice caps are quickly melting. The melting ice threatens to shrink glaciers. The shrinking could raise sea levels around the world.

Rising Waters

What happens at the polar ice caps could affect the entire globe, said Bette Otto-Bliesner of the National Center for Atmospheric Research.

A large amount of polluting gases is produced when people burn fossil fuels such as coal and oil to produce power for cities, factories and cars and to heat homes.

According to the studies, an increase in the release of these gases could raise Arctic temperatures by 5 to 8 degrees within the next 100 years. That warmth could melt ice caps. The melting ice could then raise sea levels one to three feet over the next 100 to 150 years.

Melting Glaciers

Another study reports an increase in earthquakes caused by melting glaciers. The number of glacial earthquakes in Greenland's polar region has more than doubled since 2002.

"People often think of glaciers as . . . slow moving, but in fact they can also move rather quickly," researcher Goeran Ekstroem of Harvard University said.

Some glaciers are as large as Manhattan, New York, and as tall as the Empire State Building! How do warming temperatures contribute to earthquakes? As glaciers melt, flowing water eases their path. This can cause sudden movement, which makes the ground shake.

40 Melting glaciers cause the ocean water

- ☐ **A** to freeze
- ☐ **B** to condense
- ☐ **C** levels to rise
- ☐ **D** levels to drop

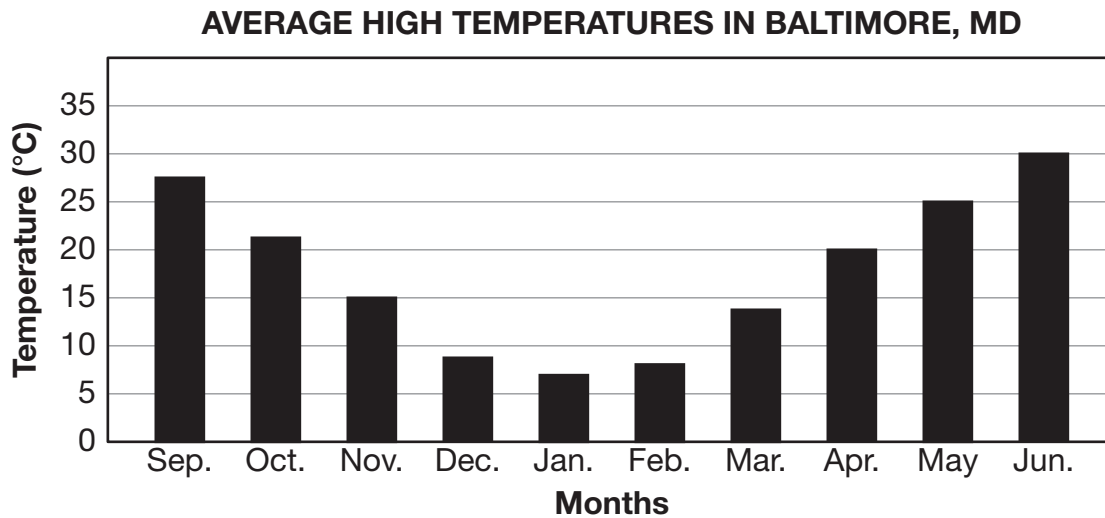
41 Which human activity most negatively affects the glacial environment?

- ☐ **A** destruction of habitat
- ☐ **B** increased land pollution
- ☐ **C** decreased use of fossil fuels
- ☐ **D** production of polluting gases

42 How would polar ice melting most likely affect people in Maryland?

- ☐ **A** There would be less air pollution.
- ☐ **B** There would be more air pollution.
- ☐ **C** Less land would be available on which to live.
- ☐ **D** More land would be available on which to live.

- 43 A group of students in Baltimore, Maryland, determined the average high temperature for each month during the school year.



Which two months shown in the graph had the lowest average temperatures?

- ☐ A September and June
- ☐ B November and December
- ☐ C January and February
- ☐ D October and May

44 Strong winds have the ability to uproot large trees in a wooded area.

Which of these organisms would most likely benefit from this change in a habitat?

- ☐ **A** a bee colony that needs a hive
- ☐ **B** a bird that needs to build a nest
- ☐ **C** a squirrel that needs to find shelter
- ☐ **D** a plant that needs sunlight to grow



Acknowledgements

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